

What is claimed is:

1) A method of flow control implemented by a system disposed to execute a protocol stack and an application, said method comprising the steps of:

5 configuring the system to operate in a push mode pursuant to which the protocol stack initiates the forwarding, to the application, of a first sequence of data packets received by the protocol stack; and

 configuring the system to operate in a pull mode pursuant to which the application initiates the forwarding, to the application, of a second sequence of data packets received by the
10 protocol stack.

2) The method of claim 1 further including transitioning the system from operation in the push mode to operation in the pull mode in response to a first input notification, wherein the push mode and the pull mode constitute mutually exclusive modes of operation.

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3) The method of claim 1 further including transitioning the system from operation in the pull mode to operation in the push mode in response to a second input notification.

4) The method of claim 2 wherein the first input notification includes a receive sequence
20 number corresponding to a sequence number of a data packet which, upon receipt at the protocol stack, induces the transitioning the system from operation in the push mode.

5) The method of claim 3 wherein the second input notification includes a receive sequence
25 number corresponding to a sequence number of a data packet which, upon receipt at the protocol stack, induces the transitioning the system from operation in the pull mode.

6) The method of claim 1 further including sending, from the protocol stack to the application, receive data indications containing ones of the first sequence of data packets when the protocol stack is functioning in an always forward mode invoked during operation of the
30 system in the push mode.

7) The method of claim 6 wherein the protocol stack assumes that the first sequence of data packets are consumed upon delivery to the application and frees storage corresponding to the first sequence of data packets upon the sending of the receive data indications.

5 8) The method of claim 7 wherein the protocol stack advertises a new window to a peer entity upon freeing of the storage.

9) The method of claim 6 wherein the protocol stack postpones freeing of storage corresponding to the first sequence of data packets until confirmation is received from the
10 application that the first sequence of data packets has been consumed by the application.

10) The method of claim 1 further including utilizing credit-based flow control during operation of the system in the push mode, the credit-based flow control including configuring the application to provide buffer credits to the protocol stack.

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11) The method of claim 10 wherein the credit-based flow control permits the protocol stack to forward ones of the data packets within the first sequence to the application provided a sufficient number of the buffer credits remain available.

20 12) The method of claim 1 further including sending, from the protocol stack to the application, data available indications when the protocol stack is functioning in an always buffer mode invoked during operation of the system in the pull mode wherein the data available indications are generated at the protocol stack in response to receipt of the data packets within the second sequence.

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13) The method of claim 12 further including forwarding the second sequence of data packets from the protocol stack to the application upon receipt at the protocol stack of a read data request generated by the application.

30 14) The method of claim 12 wherein the data available indications are generated upon receipt of the data packets within the second sequence without intervention of the application.

15) The method of claim 12 wherein generation of the data available indications is postponed until receipt at the protocol stack of a read data request generated by the application.

5 16) The method of claim 1 further including configuring the protocol stack to withhold acknowledgements which would otherwise be sent to an external peer entity upon receipt of the first sequence of data packets from the peer entity.

10 17) The method of claim 1 further including configuring the protocol stack to withhold acknowledgements which would otherwise be sent to an external peer entity upon receipt of the second sequence of data packets from the peer entity.

18) The method of claim 16 or 17 further including:

15 sending an acknowledgement prompt indication event from the protocol stack to the application, and

sending the acknowledgements from the protocol stack to the external entity upon receipt at the protocol stack of an acknowledgement prompt confirmation from the application.

20 19) The method of claim 1 further including sending a window available indication from the protocol stack to the application upon receipt at the protocol of an open receive window indication from an external peer entity.

25 20) The method of claim 1 further including sending a room available indication from the protocol stack to the application when sufficient space exists in a send buffer associated with the protocol stack.

21) A method of flow control implemented by a system disposed to execute a protocol stack and an application, said method comprising the steps of:

receiving a sequence of data packets at the protocol stack;

5 determining whether a sufficient number of receive credits are currently available to the protocol stack to permit forwarding of the sequence of data packets from the protocol stack to the application; and

sending receive data indications from the protocol stack to the application when the sufficient number of receive credits are available, the receive data indications containing the sequence of data packets.

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22) The method of claim 21 wherein the protocol stack assumes that the sequence of data packets are consumed upon delivery to the application and frees storage corresponding to the first sequence of data packets upon the sending of the receive data indications.

15 23) The method of claim 22 wherein the protocol stack advertises a new window to a peer entity upon freeing of the storage.

24) The method of claim 21 wherein the protocol stack postpones freeing of storage corresponding to the first sequence of data packets until confirmation is received from the
20 application that the first sequence of data packets has been consumed by the application.

25) The method of claim 21 wherein the application replenishes the receive credits available to the protocol stack.

25 26) The method of claim 21 further including configuring the protocol stack to withhold acknowledgements which would otherwise be sent to an external peer entity upon receipt of the sequence of data packets from the peer entity.

27) The method of claim 26 further including:

sending an acknowledgement prompt indication event from the protocol stack to the application, and

5 sending the acknowledgements from the protocol stack to the external entity upon receipt at the protocol stack of an acknowledgement prompt confirmation from the application.

28) The method of claim 21 further including sending a window available indication from the protocol stack to the application upon receipt at the protocol of an open receive window indication from an external peer entity.

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29) A method of flow control implemented by a system disposed to execute a protocol stack and an application, said method comprising the steps of:

receiving a sequence of data packets at the protocol stack and generating corresponding data available indications;

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sending, from the protocol stack to the application, the data available indications; and

forwarding the sequence of data packets from the protocol stack to the application in response to a read data request issued by the application.

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30) The method of claim 29 wherein the data available indications are generated automatically upon receipt at the protocol stack of the data packets within the second sequence.

31) The method of claim 29 wherein generation of the data available indications is postponed until receipt at the protocol stack of a read data request generated by the application.

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32) The method of claim 29 further including configuring the protocol stack to withhold acknowledgements which would otherwise be sent to an external peer entity upon receipt of the sequence of data packets from the peer entity.

33) The method of claim 32 further including:

sending an acknowledgement prompt indication event from the protocol stack to the application, and

5 sending the acknowledgements from the protocol stack to the external entity upon receipt at the protocol stack of an acknowledgement prompt confirmation from the application.

34) The method of claim 29 further including sending a window available indication from the protocol stack to the application upon receipt at the protocol of an open receive window indication from an external peer entity.

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35. A stateful protocol system comprising:

a protocol stack;

an application; and

15 means for configuring the system in a push mode pursuant to which the forwarding of data packets received by the protocol stack is initiated by the protocol stack and in a pull mode pursuant to which the forwarding of the data packets is initiated by the application.

36) The system of claim 35 wherein the push mode and the pull mode constitute mutually exclusive modes of operation.

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37) The system of claim 35 wherein the means for configuring includes means for transitioning the system from operation in the push mode to operation in the pull mode in response to a first input notification wherein the first input notification includes a receive sequence number corresponding to a sequence number of a data packet which, upon receipt at
25 the protocol stack, induces the transitioning the system from operation in the push mode.

38) The system of claim 35 wherein the means for configuring includes means for transitioning the system from operation in the pull mode to operation in the push mode in response to a second input notification wherein the second input notification includes a receive
30 sequence number corresponding to a sequence number of a data packet which, upon receipt at the protocol stack, induces the transitioning the system from operation in the pull mode.